

FIG. 1

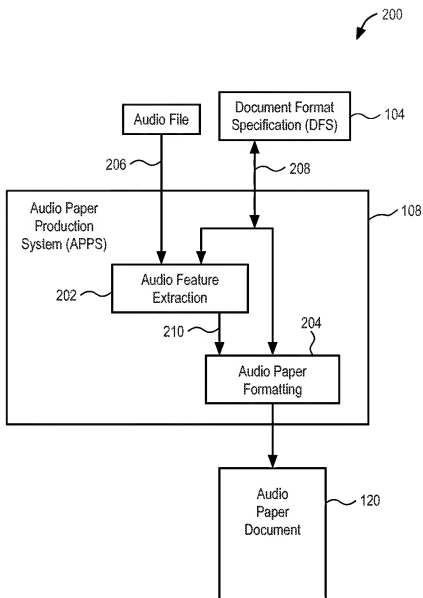


FIG. 2

APPS Processing Steps

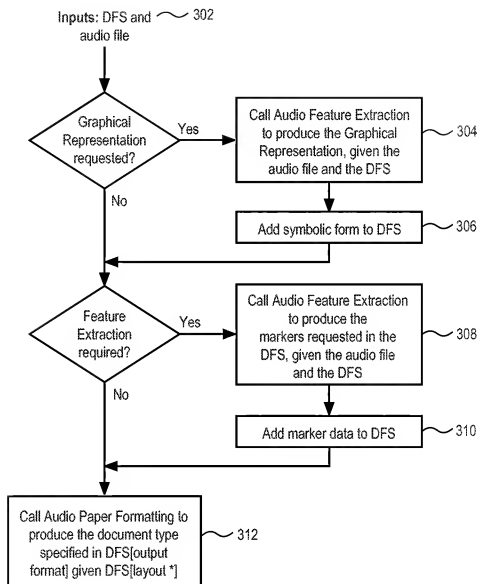


FIG. 3

Audio Paper Formatting module

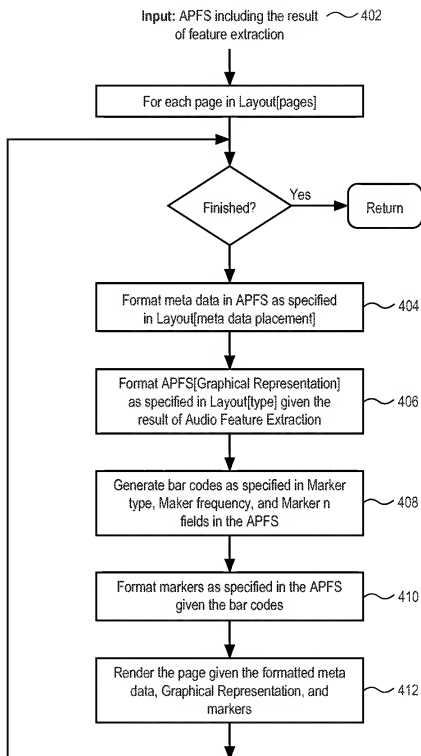


FIG. 4

Bar code generation

Inputs:

- Bar code type (e.g., Interleaved 2 of 5),
- No. of Identifier digits in bar code, ~ 502
- No. of time stamp digits in bar code,
- Time stamp value

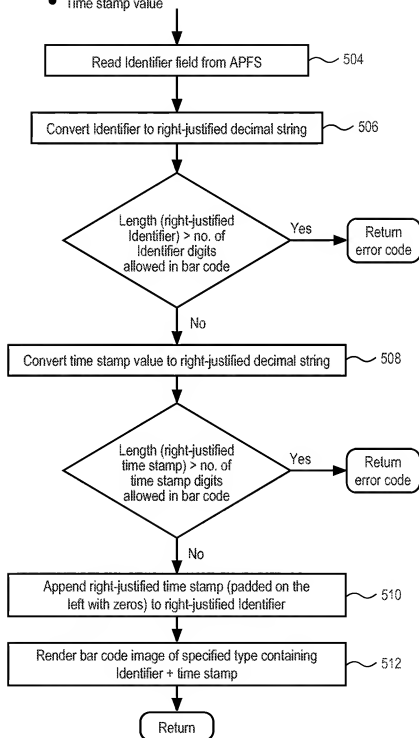


FIG. 5

104 Document Format Specification

604 ~ Type = Musical recording
 608 ~ Identifier = 1768
 610 ~ Title = Locomotion
 612 ~ Artist = John Coltrane
 614 ~ Collection = Blue Train
 616 ~ Publisher = Blue Note Records
 618 ~ Publication Date = 1957
 620 ~ Begin time = 00:00:00
 622 ~ End time = 00:07:14

Graphical Representation = Amplitude curve ~ 624

Marker type = bar code ~ 628

Marker frequency = 30 sec. intervals ~ 630

Layout type = One horizontal time line ~ 632

634 ~ Layout pages = 1

Layout marker placement = Above graphical representation ~ 636

Layout meta data placement = Centered at top of page ~ 638

602 Audio Feature Extraction

Audio amplitude extraction and graphical approximation. An svg file is output. ~ 606

FIG. 6a

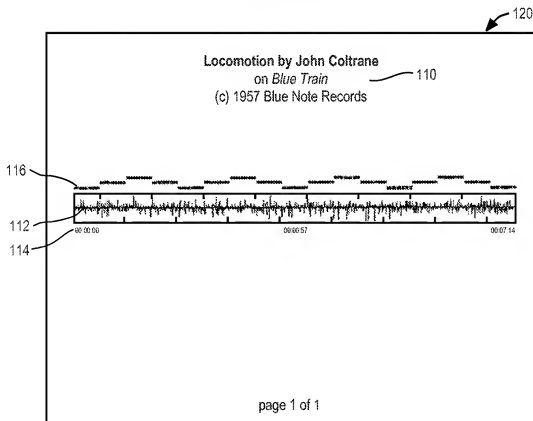


FIG. 6b

104

Document Format Specification

Type = Musical recording
 Identifier = 1769
 Title = Locomotion
 Artist = John Coltrane
 Collection = Blue Train
 Publisher = Blue Note Records
 Publication Date = 1957
 Begin time = 00:00:00
 End time = 00:07:14
 Graphical Representation = Amplitude curve

702 ~ Feature extraction = Musical solos (output is instrument name and time when solo began)

704 ~ Marker type 1 = Instrument name above bar code above time stamp

706 ~ Marker type 2 = bar code

708 ~ Marker2 frequency = 0, 50%, 100%

Layout type = One horizontal time line

Layout pages = 1

Layout marker 1 placement = Above graphical representation ~ 710

Layout marker 2 placement = Below time line ~ 712

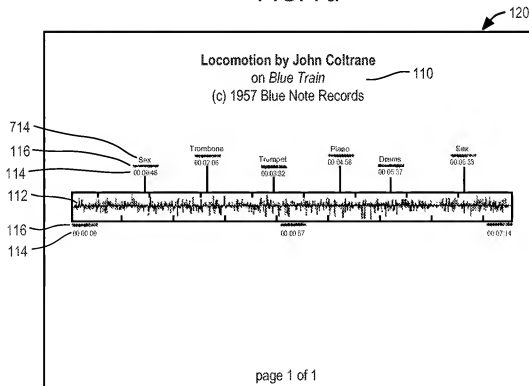
Layout meta data placement = Centered at top of page

Audio Feature Extraction

Audio amplitude extraction and graphical approximation. An svg file is output. Musical Solo extraction is also applied. It outputs the beginning times and instrument for each musical solo.

602

606

FIG. 7a**FIG. 7b**

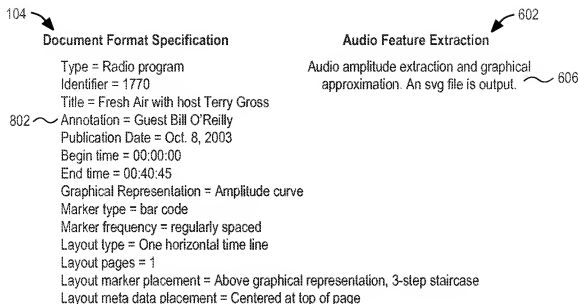


FIG. 8a

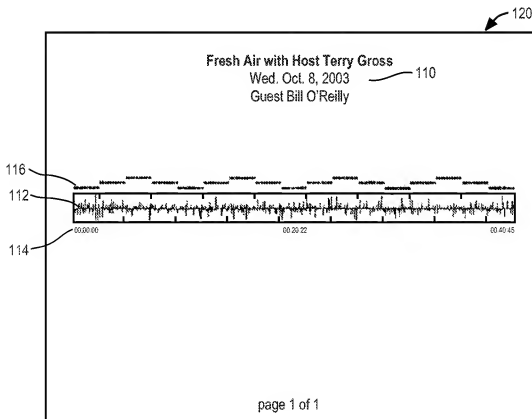


FIG. 8b

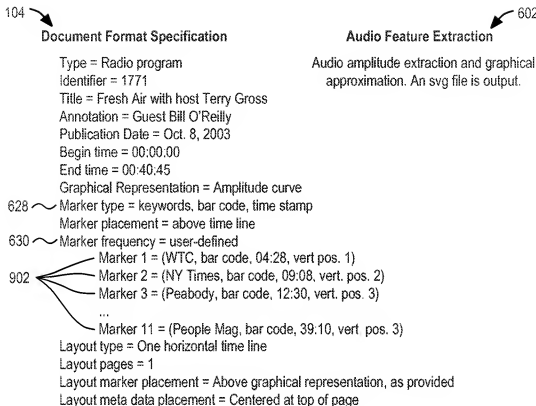


FIG. 9a

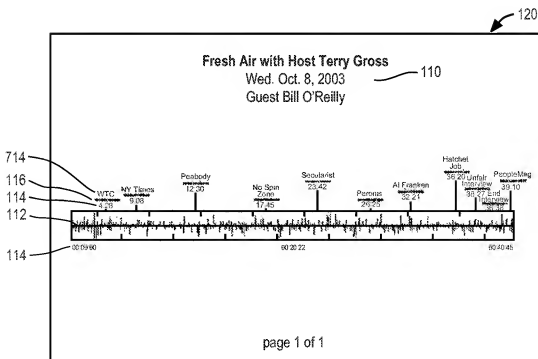


FIG. 9b

- 104 Document Format Specification
- Type = Radio program
Identifier = 1772
- Title = Fresh Air with host Terry Gross
Annotation = Guest Bill O'Reilly
keyword search terms = "New York Terms" and
"fair and balanced"
- Publication Date = Oct. 8, 2003
Begin time = 00:00:00
End time = 00:40:45
Graphical Representation = Amplitude curve
- 702 Feature extraction = speech recognition and keyword match to "New York Times" or
"fair and balanced"
- 628 Marker type = matching search term, bar code, time stamp
Marker placement = above time line
- 630 Marker frequency = user-defined
- 902 Marker 1 = ("fair and balanced", bar code, 02:31, vert pos. 2)
Marker 2 = ("New York Times", bar code, 04:21, vert pos. 1)
Marker 3 = ("New York Times", bar code, 14:54, vert pos. 2)
...
Marker 9 = ("New York Times", bar code, 35:12, vert pos. 3)
- Layout type = One horizontal time line
Layout pages = 1
Layout marker placement = Above graphical representation, as provided
Layout meta data placement = Centered at top of page
- 602 Audio Feature Extraction
- Audio amplitude extraction and graphical approximation. An svg file is output.
Speech recognition is also applied followed by matching to a given list of phrases.

FIG. 10a

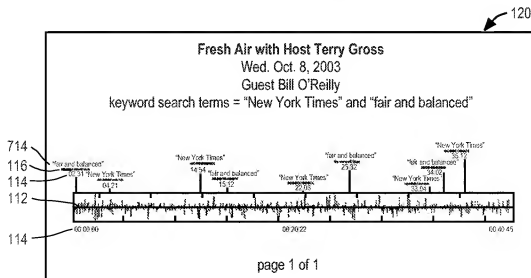


FIG. 10b

104

Document Format Specification

Type = Radio program

Identifier = 1773

Title = A Prairie Home Companion

Annotation = applause events shown

Publication Date = Sun. Oct. 12, 2003

Begin time = 00:00:00

End time = 01:58:56

Graphical Representation = Amplitude curve

702 Feature extraction = applause detection alpha=0.27 beta=1.86

Marker type = time stamp, bar code

Marker placement = above time line

Marker frequency = user-defined

Marker 1 = (00:02:13, bar code, pos. 1)

Marker 2 = (00:10:54, bar code, pos. 2)

Marker 3 = (00:12:32, bar code, pos. 3)

...

Marker 16 = (01:56:01, bar code, pos. 2)

Layout type = One horizontal time line

Layout pages = 1

Layout marker placement = Above graphical representation, as provided

Layout meta data placement = Centered at top of page

602

Audio Feature Extraction

Audio amplitude extraction and graphical approximation. An svg file is output.

Applause detection outputs time stamps.

FIG. 11a

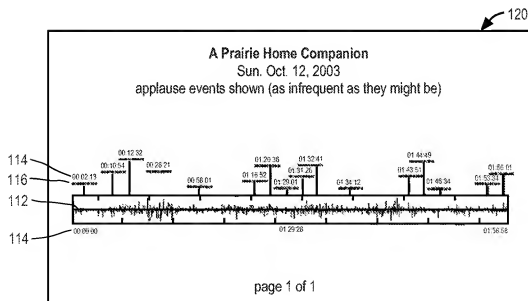


FIG. 11b

104

Document Format Specification

Type = Radio program
 Identifier = 1774
 Title = A Prairie Home Companion
 Annotation = music events shown
 Publication Date = Sun. Oct. 12, 2003
 Begin time = 00:00:00
 End time = 01:58:56
 Graphical Representation = Amplitude curve

702 ~ Feature extraction = music detection delta = 12.93
 Marker type = time stamp, bar code
 Marker placement = right of time line
 Marker frequency = user-defined

Marker 1 = (00:21:54, bar code, horiz. pos. 1)

Marker 2 = (01:10:53, bar code, horiz. pos. 1)

Marker 3 = (01:34:01, bar code, horiz. pos. 1)

Marker 4 = (01:41:41, bar code, horiz. pos. 1)

632 ~ Layout type = Two vertical time lines, split in half

Layout pages = 1

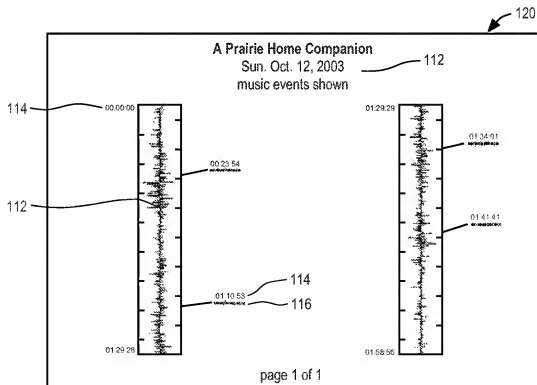
Layout marker placement = To right of graphical representation, as provided

Layout meta data placement = Centered at top of page

Audio Feature Extraction

Audio amplitude extraction and graphical approximation. An svg file is output.
 Music detection outputs time stamps.

602

FIG. 12a**FIG. 12b**